



Homework 3 Lists and linked lists

1. A list of client records is stored in a dynamic **list** data structure **clients**.

The list contains the following elements:

```
clients = ['Gries', 'Schneider', 'Bergin', 'Kozen', 'Pearce']
```

Show the state of the list after the execution of the following operations. [2]

```
pop(), remove('Bergin'), append('Kizza'), pop(1), append('Brooks'),  
insert(2, 'Merritt')
```

3. Here is a list of available operations on a list

List operation	Description
isEmpty()	Test for empty list
append(item)	Add a new item to list
search(item)	Search for an item in list
length()	Return the number of items
index(item)	Return the position of item
insert(pos, item)	Add a new item
pop()	Remove and return the last item in the list
pop(pos)	Remove and return the item at position pos

- (a) Using only the operations from this list, describe how to delete an item. [3]

- (b) Using only the operations from this list, describe how you could add an item to the end of the list without using *append(item)*. [2]

- (c) Using only the operations from this list, describe how to implement the queue methods *enqueue(item)* and *item = dequeue()*. Do not worry about full or empty. [2]





3. Fruit is going to be stored as a list.

Here is a list of fruit records: (Banana, Strawberry, Melon, Lemon)

- (a) Draw a diagrammatic representation of this list in alphabetical order, when implemented as a classic linked list.
- (b) Draw a diagram to show how Blueberry would be added to the list.
- (c) Explain how you would insert a new item into the linked list, maintaining the correct alphabetic sequence. Assume next free points to the next free space in the list. [4]
- (d) Write a pseudocode algorithm to print out all the items in the list, and the total number of items. [5]

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Unit 7 Data structures



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[Total 20 Marks]